

<b>Notice of Allowability</b>	Application No.	Applicant(s)	
	10/743,216	KIM ET AL.	
	Examiner	Art Unit	
	LOHA BEN	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTO-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to Applicants' application dated December 22, 2003.
2.  The allowed claim(s) is/are 1-33.
3.  The drawings filed on 22 December 2003 are accepted by the Examiner.
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a)  All    b)  Some\*    c)  None    of the:
    1.  Certified copies of the priority documents have been received.
    2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a)  including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1)  hereto or 2)  to Paper No./Mail Date \_\_\_\_\_.
  - (b)  including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1.  Notice of References Cited (PTO-892)
2.  Notice of Draftsperson's Patent Drawing Review (PTO-948)
3.  Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4.  Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5.  Notice of Informal Patent Application (PTO-152)
6.  Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7.  Examiner's Amendment/Comment
8.  Examiner's Statement of Reasons for Allowance
9.  Other \_\_\_\_\_.



**Loha Ben**  
**Primary Examiner**

### **EXAMINER'S AMENDMENT**

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

#### **In the Claims**

In claim 1: lines 4, 7, 11 and 17, "die" has been deleted to provide antecedent basis for lines 8 and 9, 15 and 19 of claim 1; line 2 of claims 5-7; lines 2 and 4 of claim 8; lines 2 and 3 of claim 10; and lines 3-5 of claim 12.

The dependency of claim 12 has been changed from "claim 13" to – claim 1 --. See dependency of claim 27 for comparison.

In claim 16: lines 4 and 11, "die" has been deleted to be consistent with lines 8, 9, 15 and 18 of claim 16, and line 4 of claim 27.

Fully amended texts are given below:

1. (Currently Amended) A printed circuit board assembly with optical devices packaged therein, comprising:

a plate type heat spreader;

a driving printed circuit board [[die]] bonded to a top of the heat spreader to convert electrical and optical signals to optical and electrical signals, respectively;

a driving integrated circuit [[die]] bonded to the top of the heat spreader and wire bonded to the driving printed circuit board;

an optical signal transmitting/receiving printed circuit board [[die]] bonded to a bottom of the heat spreader, with at least one waveguide for transmitting optical signals being arranged therein;

at least one optical signal coupling block mounted on the optical signal transmitting/receiving printed circuit board; and

optical devices [[die]] bonded to the bottom of the heat spreader and wire bonded to the optical signal transmitting/receiving printed circuit board to transfer optical signals to the optical signal coupling block.

12. (Currently Amended) The printed circuit board assembly according to claim [[13]] 1, further comprising alignment targets attached to predetermined positions of the optical devices and the optical signal transmitting/receiving printed circuit board to accurately arrange the optical devices.

16. (Currently Amended) A printed circuit board assembly with optical devices packaged therein, comprising:

a plate type heat spreader;

a driving printed circuit board [[die]] bonded to a top of the heat spreader to convert electrical and optical signals to optical and electrical signals, respectively;

a driving integrated circuit arranged on the driving printed circuit board and flip-chip bonded to the driving printed circuit board;

an optical signal transmitting/receiving printed circuit board [[die]] bonded to a bottom of the heat spreader, with at least one waveguide for transferring optical signals being arranged therein;

at least one optical signal coupling block mounted on the optical signal transmitting/receiving printed circuit board; and

optical devices arranged on the optical signal transmitting/receiving printed circuit board and flip-chip bonded thereto to transfer optical signals to the optical signal coupling block.

#### **R E A S O N S   F O R   A L L O W A N C E**

The following is an examiner's statement of reasons for allowance: Best reference of record is Chakravorty et al. The latter, despite the similarity of its device with that of the present invention as to optical and electronic components of the assembly that are arranged in connection with the integrated circuit and the printed circuit board, fails to teach or fairly suggest that the printed circuit board and the integrated circuit are positioned **on the same surface of a plate type heat spreader**. The assembly of the patent **has two substrates** (not one heat spreader), each having first and second surfaces. Each first surface has an integrated circuit thereon, and both second surfaces have one printed circuit board bonded thereto. This difference alone would signify the divergent subject matter between the two inventions.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Loha Ben whose telephone number is (571) 272-2323. The examiner can normally be reached on Monday to Saturday, generally between 12:00 noon and 8:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps, can be reached on Monday to Friday, at (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

December 22, 2004



**Loha Ben**  
**Primary Examiner**